

**DESIGNING AND DEVELOPING AN ONLINE SERVICES SYSTEM: A CASE
OF MAYBANK STUDENTS' RESIDENTIAL HALL**

**A Thesis submitted to the College of Arts and Sciences in full fulfillment of the
requirements for the degree of Master of Science**

Universiti Utara Malaysia

by

Ahmed H. Said Al Azawei

©2009, Ahmed

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor(s) or, in their absence by the Dean of Faculty of Information Technology. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to

Dean of Faculty of Information Technology

Universiti Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman.

ABSTRACT

When internet services became cheap and available in the world, many organizations use it to enhance its benefits and to communicate with users in anywhere and anytime. Because that most universities used the facilities in online services to increase their abilities in organizing work. Online services are not limited to use in the universities for e-learning only. Although, the students who interact with online services increasingly, a common problem is that students online services need more efficient interaction. In other words, the sites lack usability; this research to design and develop an online services system for Maybank Students' Residential Hall aid to solve this problem and to support the communication between students and residential hall staff.

Key word: Information Technology, Online Services

ACKNOWLEDGEMENT

By the Name of Allah, the Most Gracious and the Most Merciful

First of all I thank to Allah for giving me the strength to complete my master generally and this thesis specifically.

I would like to say big thanks to everyone gave me a minute of his/her time to help me finishing my work. I hope to be as good as they want. I would like to thank my supervisor Dr. Shafiz Affendi Bin Mohd Yusof for his advice and supervision during the preparation of this project. I'm gratefully and deeply thank him for his support and cooperation as being equipped to provide his best help.

Furthermore I would like to thank all the dear members of my family, especially my mother and father (May Allah have mercy on their), my wife and all my brothers and sisters for their kindness and support, as well as all lecturers at the faculty of Information Technology, that they gave me all the information for completing the requirements of this study, especially my evaluator Mr. Mohamad Amir Abu Seman for his advice and the principal of Maybank Students' Residential Hall Mr. Azizan Husain. "My Allah blesses all of them".

TABLE OF CONTENTS

PERMISSION TO USE	ii
ABSTRACT	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
CHAPTER ONE: INTRODUCTION	
1.0 Introduction	1
1.1 Problem Statement	5
1.2 Research Questions	6
1.3 Objectives	6
1.4 Limitation and Scope	7
1.5 Significance of Research	7
1.6 Organization of the Research	8
1.7 Summary	9
CHAPTER TWO: LITERATURE REVIEW	
2.0 Introduction	10
2.1 Web Services	11
2.1.1 Definition of Web Services Technology	12
2.1.2 Previous Studies Used Online Services Application	12
2.2 User Needs and Usability Requirements	14
2.2.1 Concept of Usability	14
2.2.2 Previous Studies Used Usability Requirements	16
2.3 Online Services at Universities	18
2.4 Summary	22
CHAPTER THREE: RESEARCH METHODOLOGY	
3.0 Introduction	23
3.1 Design Research Methodology	23
3.1.1 Awareness of Problem	25
3.1.1.1 Collect Data	25
3.1.2 Segmentation	26
3.1.3 Development	27
3.1.3.1 Overall Customer Experience	28
3.1.3.2 Moving Around the Form (Navigation, Workflow & Orientation)	29
3.1.3.3 Reading the Site (Written Content)	30
3.1.3.4 Viewing the Site (Layout & Presentation)	31
3.1.3.5 Interaction Design	33
3.1.4 Evaluation	34
3.1.5 Conclusion	35
3.2 Summary	35

CHAPTER FOUR: RESULTS	
4.0 Introduction	36
4.1 Proposed System	36
4.2 System Requirements	36
4.2.1 Functional Requirements	36
4.2.2 Non Functional Requirements	37
4.2.3 Hardware Requirements	38
4.2.4 Software Requirements	38
4.3 System Design	39
4.3.1 Use Case Diagram	39
4.3.2 Use Case Specification	40
4.3.3 Sequence Diagram	40
4.3.4 Class Diagram	53
4.3.5 Database Design	53
4.4 System Development	57
4.4.1 Introduction	57
4.4.2 System Architecture	57
4.4.3 Using Usability Guideline (UG) in System Development	59
4.4.4 Graphical User Interface	63
4.5 Summary	70
CHAPTER FIVE: RESULT DISCUSSION	
5.0 Introduction	71
5.1 Evaluation Techniques	72
5.2 Evaluation Questionnaire	72
5.3 Data Analysis	73
5.3.1 Respondent Profile Analysis	73
5.3.2 Descriptive Statistics	75
5.3.2.1 Descriptive Statistics for Each Section	75
5.3.2.2 Descriptive Statistics for all Sections	81
5.3.3 Reliability Statistics	83
5.3.3.1 Reliability Statistics for Each Section	83
5.3.3.2 Reliability Statistics for all Sections	85
5.3.4 Item-Total Statistics	85
5.3.5 Summary Item Statistics	87
5.4 Summary	87
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS	
6.0 Introduction	88
6.1 Conclusion of the Study	88
6.2 Study Contributions	88
6.3 Problems and Limitations	89
6.4 Future Works	89
6.5 Recommendations	90
6.6 Summary	90

REFERENCES	91
Appendix A	95
Appendix B	100
Appendix C	113
Appendix D	124

LIST OF TABLES

No	Name of Tables	Page
1.1	Resident Countries	3
2.1	Number of Active Citibank Online Customers (Al-Mudimigh, 2007)	14
3.1	Functional Requirements	26
4.1	Admin_Log Table	54
4.2	Students Table	55
4.3	Student Request Table	55
4.4	Admin Response Table	56
4.5	Announcement Table	56
4.6	Prototype Development Environment	58
5.1	Descriptive Statistics (Section B)	75
5.2	Descriptive Statistics (Section C)	77
5.3	Descriptive Statistics (Section D)	78
5.4	Descriptive Statistics (Section E)	79
5.5	Descriptive Statistics (Section F)	80
5.6	Descriptive Statistics for all Sections	81
5.7	Reliability Statistics (Section B)	83
5.8	Reliability Statistics (Section C)	83
5.9	Reliability Statistics (Section D)	84
5.10	Reliability Statistics (Section E)	84
5.11	Reliability Statistics (Section F)	84
5.12	Reliability Statistics	85
5.13	Item -Total Statistics	85
5.14	Summary Item Statistics	87

LIST OF FIGURES

No	Name of Figures	Page
2.1	Architecture of an Online Service Application	13
3.1	Design Research Methodology (Vaishnavi & Kuechler, 2004)	24
4.1	Online Services System: Maybank Students' Residential Hall Use Case	40
4.2	Admin and Student Login Sequence Diagram	41
4.3	Admin and Student Change Password Sequence Diagram	42
4.4	Admin add New Student Information Sequence Diagram	43
4.5	Admin Update Student Information Sequence Diagram	44
4.6	Admin Delete Student Information Sequence Diagram	45
4.7	Admin Search Student Information Sequence Diagram	46
4.8	Admin Send New Announcement Sequence Diagram	47
4.9	Admin Delete Announcement Sequence Diagram	48
4.10	Admin Manage Response to Students Request Sequence Diagram	49
4.11	Student Send Request Sequence Diagram	50
4.12	Student View Admin Response Sequence Diagram	51
4.13	Student View Announcement Sequence Diagram	52
4.14	Class Diagram for Online Services System of MSRH	53
4.15	Server-Side Programming Model (McMahon, 2005)	57
4.16	Online Services System of Maybank Students Residential Hall Architecture	58
4.17	Red Bold Text for Error Message	61
4.18	Inform User About Mandatory Fields	62
4.19	Dialog Box to Confirm User Action	62
4.20	Home Page	65
4.21	Admin Login Page	66
4.22	Admin Home Page	67
4.23	Add New Students' Information Page	68
4.24	Student Home Page	69
4.25	Student Add Request Page	70
5.1	The Educational Background of the Respondents	73
5.2	The Semester of the Respondents	73
5.3	Internet Usage	74
5.4	Gender of the Respondents	74
5.5	Related Between the Respondents and IT	75
5.6	Descriptive Statistics (Section B)	76
5.7	Descriptive Statistics (Section C)	77
5.8	Descriptive Statistics (Section D)	79
5.9	Descriptive Statistics (Section E)	80
5.10	Descriptive Statistics (Section F)	81

LIST OF ABBREVIATIONS

ARPANET	Advanced Research Projects Agency Network
ASP	Active Server Page
CAS	College Arts of Science
E Business	Electronic Business
E Learning	Electronic Learning
HTTP	Hyper Text Transfer Protocol
IS	Information System
ISO	International Organization for Standardization
ISP	Internet Service Provider
IT	Information Technology
MADB	Microsoft Access Data Base
MBA	Master of Business Administration
MSc	Master of Science
MUG	Microsoft Usability Guidelines
NSF	National Science Foundation
Online Services-MSRH	Online Services System of Maybank Students' Residential Hall
OU	Open University
RRS	Response of Request Schedule
SPSS	Statistical Package for Social Sciences
UG	Usability Guideline
UML	Unified Modeling Language
UUM	University Utara Malaysia
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The online services appeared to increase the communication ways between users and organizations. They represent the easier and efficient services. We can notes that these services appeared after the developing of communication technologies.

The history of communication technologies includes mail, the telegraph, the telephone and the internet. However, the internet is the latest in a long succession of communication technologies (Odlyzko, 2001). According to Preece (2001) the term 'Online Community' means different things to different people. This case means there is no accepted definition to this term. In other side the researchers defined Online Community in general is: a group of people who interact in a virtual environment (Preece & Krichmar & Abras, 2003). The problem with the term “online community” has been determined is that it refers to a big domain of online activities (Preece & et al, 2003).

These communications technologies have played an important role in providing facilities to people in different aspects of life. The spread of the internet was the biggest role in the process of progress and thus to be deployed a lot of sites on the internet as well to

The contents of
the thesis is for
internal user
only

REFERENCES

- Allen, K., & Brown, P. (2005). delivering student services online via your online course tool.
- Aldridge, G. (2004). Managing Large Scale On-Line Systems [Electronic Version]. Retrieved 23/8/2008 from csdl2.computer.org/comp/proceedings/icalt/2001/1013/00/10130011.pdf
- Al-Mudimigh, A. S. (2007). E-Business Strategy in an Online Banking Services: A Case Study. *Journal of Internet Banking and Commerce*, 12(1).
- Al-Zoubi, S., Alfawaer, Z. M., & Al-Zoubi, M. (2008). Web-based Projects Evaluation Management System. *Journal of Computer Science* 4 (11): 916-921, 2008.
- Aissi S., Malu P., & Srinivasan K. (2002). E-Business Process Modeling: The Next Big Step. 35(5).
- Amer, S. A. (2006). USABILITY OF ONLINE LIBRARY SYSTEMS CASE OF SULTANAH BAHYAH, UUM. University Utara Malaysia, Kedah.
- Arteaga, E. L. (2005). History of the Internet [Electronic Version]. Retrieved 24/2/2009 from <http://faculty.mdc.edu/earteaga/pdfs/Mod10LectNotes.pdf>.
- Burgstahler, S. (2008) Equal Access: Universal Design of Student Services, retrieved on (8 January 2009) from http://www.washington.edu/doit/Brochures/PDF/equal_access_ss.pdf
- Bygstad, B., & Sørum, H. (2007). An Instrument for Web Site Evaluation [Electronic Version]. NOKOBIT Retrieved 27-Dec-2008 from <http://144.162.197.250/ITCmembersOnly/StudentServices.pdf>.
- Callahan, E., & Koenemann, J. (2000). A Comparative Usability Evaluation of User Interfaces For Online Product Catalogs [Electronic Version] Retrieved 27-Nov-2008 from <http://www.ics.uci.edu/~kobsa/courses/ICS280/notes/papers/callahan-koenemann.pdf>.
- Chen, M. Y., Kıcıman, E., & Brewer, E. (2003). An Online Evolutionary Approach to Developing Internet Services.
- Cho, S. M., Kim, H. H., Cha, S. D., & Bae, D. H. (2000). A semantics of sequence diagrams (sequence diagram)
- Chong, Y. B., & Mulhern, K. (2004). An Evaluation of Microsoft Access as a Records Management Software.

- Crawley, A. (2004). Online Student Services Benefit All Students. Retrieved 28/2/2009, from http://www.studentaffairs.com/ejournal/Winter_2004/OnlineStudentServices.htm
- Dalziel, C., & Payne, M. (2001). Student Services Retrieved 29-Nov-2008 from <http://144.162.197.250/ITCmembersOnly/StudentServices.pdf>.
- Department of Industry, T. a. R., & Ltd, a. T. H. G. P. (2006). On Line Form Usability Design Guidelines. Retrieved 23-Dec-2008 from <https://transactions.business.gov.au/smartforms/general%20form%20usability%20design%20guidelines%20V1.2.pdf>.
- Field, A. (2006). Reliability Analysis [Electronic Version]. Retrieved 4/4/2009 from <http://www.sussex.ac.uk/Users/andyf/reliability.pdf>.
- Gaffney's , G. (2000). Introduction to Web Usability
- Mait. (2008). e-Government in Malaysia [Electronic Version], 96. Retrieved 6/3/2009 from http://www.mait.com/admin/enews_images/MAIT%20Country%20Intelligence%20eNews96_37.pdf.
- Martin, R. C. (2003). UML Tutorial: Part 1 -- Class Diagrams [Electronic Version]. Retrieved 13/3/2009 from <http://www.objectmentor.com/resources/articles/umlClassDiagrams.pdf>.
- Massey, A. P., Khatri, V., & Montoya-Weiss, M. M. (2008). Online Services, Customer Characteristics and Usability Requirements. Paper presented at the Hawaii International Conference on System Sciences, Hawaii
- McMahon, P. (005). An Introduction to ASP .NET using Visual Basic .NET.
- McRae, & Lumsden. (2001). Students services.
- Murphy, E. z. D., & Bureau, C. (2007). The Usability Engineering Behind User-Centered Processes for Web Site Development Lifecycles.
- Nusir, M. s. a. (2004). the development of a postgraduate management system University Utara Malaysia, Kedah.
- Odlyzko, A. (2001). Internet pricing and the history of communications [Electronic Version].
- Pang, H., Yang, S., & Bian, L. (2008). A Web Services Based Online Training and Exam System.

- Paulsen, M. F. (2002). Online Education Systems: Discussion and Definition of Terms [Electronic Version]. Retrieved 19/3/2009 from www.nettskolen.com/in_english/web_edu.html.
- Pinhanez, C. (2007). A Services Theory Approach to Online Service Applications [Electronic Version] Retrieved 2-Jan-2009 from <http://ieeexplore.ieee.org.eserv.uum.edu.my/stamp/stamp.jsp?arnumber=4278683&isnumber=4278610>.
- Preece, J. (2001). Sociability and usability in online communities: Determining and measuring success. *Information Technology Journal*, 20, 5, 347-356.
- Preece, J., Maloney-Krichmar, D. and Abras, C. (2003). History of Emergence of Online Communities [Electronic Version].
- Project, P. I. A. L. (2002). Getting serious online: As Americans gain experience, they use the Web more at work, write e-mail with more significant content, perform more online transactions, and pursue more serious activity. *Pew Internet & American Life Project* [On-line]. Available: <http://www.pewinternet.org/reports/poc.asp?Report=55>
- Quatrani, T. (2001). Introduction to the Unified Modeling Language [Electronic Version]. Retrieved 16/3/2009 from http://www.nyu.edu/classes/jcf/g22.2440-001/handouts/intro_rdn.pdf.
- Rajasekar, S., & Philominathan, P. (2000). Research Methodology [Electronic Version] from <http://www.scribd.com/doc/6949151/Research-Methodology>.
- Sridaran R., Padmavathi G., and Iyakutti R. (2009). A Survey of Design Pattern Based Web Applications. *JOURNAL OF OBJECT TECHNOLOGY*, 8(2).
- Road, B. (2002). Authentication and Security Mechanisms in ASP.NET Web Applications [Electronic Version]. Retrieved 22/3/2009 from http://documents.iss.net/whitepapers/asp_net_whitepaper.pdf.
- Sabin, M., & Higgs, B. (2007). Teaching and Learning in Live Online Classrooms [Electronic Version] Retrieved 11-Jan-2009 from <http://unhm.unh.edu/pdf/campusconnections/cc-nov2007.pdf>.
- Shiratuddin, N., & Hassan, S. (2003). A Usability Study for Promoting eContent in Higher Education
- Spencer, G. (2001). Administrative Systems and Online Student Services [Electronic Version]. Retrieved 15/2/2009 from <http://net.educause.edu/ir/library/pdf/EDU0195.pdf>.

- STUDENT GUIDE 2008/2009 (2008). University Utara Malaysia
 Student Online Services Guide (2009). [Electronic Version]. Retrieved 3/2/2009 from
<http://portals.davenport.edu/NR/rdonlyres/EC5F8406-C5A5-481B-B472-881668B53B73/0/SOSGuide0409.pdf>.
- Tate, M., Evermann, J., Hope, B., & Barnes, S. (2007). Perceived Service Quality in a University Web Portal: Revising the E-Qual Instrument. IEEE Proceedings of the 40th Hawaii International Conference on System Sciences - 2007, 147b - 147b.
- Turnera, M., Zhub, F., Kotsiopoulosc, I., Russelld, M., Budgena, D., Bennettb, K., et al. (2004). Using Web Service Technologies to create an Information Broker: An Experience Report. Paper presented at the International Conference on Software Engineering.
- Uebersax, J. S. (2006). Likert Scales: Dispelling the Confusion. Retrieved 4/4/2009, from <http://ourworld.compuserve.com/homepages/jsuebersax/likert.htm>
- UML Use Case Diagrams. (1998). Engineering Notebook.
- Vaishnavi V & Kuechler B (2004). Design Research in information system [Electronic Version] Retrieved 7-Jan-2009 from <http://www.isworld.org/Researchdesign/drisISworld.htm>.
- VanLengen, C. A., & Haney, J. D. (2004). CREATING WEB SERVICES USING ASP.NET.
- Weerd, I. v. d. (2005). WEM: A Design Method for CMSbased Web Implementations [Electronic Version]. Retrieved 22/3/2009 from <http://www.cs.uu.nl/research/techreps/repo/CS-2005/2005-043.pdf>.
- Wilkinson, K. (2005). ORGANIZATIONAL STRUCTURE AND WEB SERVICES: A REALITY CHECK. Journal of Global Business and Technology, 1(2).
- Yang, J., & Zhao, Q. (2007). E-Business in Service: Recent Trend and Development in Online College Textbook Sales. 7(2).
- Yu, C. H. (2000). An introduction to computing and interpreting Cronbach Coefficient Alpha in SAS [Electronic Version]. Retrieved 5/4/2009 from <http://www2.sas.com/proceedings/sugi26/p246-26.pdf>.
- Zhu, F., Wang, A., & Ju, Y. (2004). A Framework to Develop a University Information Portal [Electronic Version] Retrieved 18-Dec-2008 from <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=01373422>.